

REMARKS

Claims 1-7, 10-14, 16-18, 20, 21 and 23-26 are pending.

Applicants wish to thank Examiner Metzmaier for the helpful discussion with Applicants' Representative on January 8, 2010. New experimental data were discussed. An executed Rule 132 Declaration with the new data will be filed shortly.

Claims 1, 10, 18, 25 and 26 are independent. Claims 1 and 18 and 25 relate to a dried hydrogel and Claims 10 and 26 relates to a method of making a hydrogel.

Claims 25 and 26 have been added in which the admixing with the alkali metal silicate is before or during polymerization.

Procter & Gamble, Trinh et al and Modern Superabsorbent Polymer Technology fail to disclose or suggest, alone or in combination, a dried hydrogel as claimed or a process of preparing a dried hydrogel as claimed in which a **polymerization reaction mixture**, before, during or after the polymerization and **before drying, is admixed with an alkali metal silicate**. In addition, Procter & Gamble, Trinh et al lack a disclosure of **post-crosslinking**.

Procter & Gamble discloses an odour control system with silica, AGM and zeolites (page 6, 2nd paragraph). The term "AGM" means absorbent gelling material and is used as synonym for dried hydrogels or superabsorbent polymers. However, **AGM is not a polymerization mixture before drying**. AGM is a dried hydrogel.

Since AGM is already a ready made hydrogel which is dried it is impossible to perform a step in Procter & Gamble in which a polymerization mixture is mixed with an alkali metal silicate before drying. Therefore such step is not suggested or motivated.

Further, Procter & Gamble discloses that in one embodiment, the odour control system is produced using spray drying, spray mixing or agglomeration (page 6, last paragraph). These techniques relate to the processing of AGM with binder materials such as silica. However, there is no disclosure or suggestion that a polymerization mixture before drying be used and admixed with the alkali metal silicate.

Similarly, Example 9 of Trinh et al relates to mixing of AGM with zeolite. Example 9 and col. 16, line 47 et seq. do not provide a disclosure or suggestion that a polymerization mixture before drying be used and admixed with the alkali metal silicate.

Moreover, in Procter & Gamble the silica acts as a binder (page 6, last paragraph) for the AGM particles. However, the silica is NOT INSIDE THE AGM particles but is outside the particles to make them bind. This is consistent with the fact that, as stated above, AGM is a ready made dried hydrogel that is mixed with the binder but not in such a way that the binder goes inside the AGM particles.

According to Procter & Gamble, the silica can be distributed homogeneously throughout the absorbent article (page 7, fourth paragraph). This refers to the entire absorbent article not to a distribution within AGM particles. Absorbent articles are i.e. sanitary napkins (page 1, first paragraph of Procter & Gamble) and are not the superabsorbent particles themselves. Just because the articles have a

distribution of silicate on macroscale, does not mean that the single AGM particles contained in the article have silicate distributed therein. The silicate in Procter & Gamble is a binder and thus sits outside the AGM particles to bind them. If the silicate was inside the AGM particles how would it bind them?

Further, Applicants wish to draw the Examiner's attention to page 6, 1st paragraph, of Procter & Gamble, which states that the odour control system may comprise in addition to silica, additional odour control agents such as zeolites. In other words, mixtures of silica and zeolite are what Procter & Gamble discloses. In paragraph 3 at page 6 of Procter & Gamble, AGM is used together with silica and zeolite.

However, paragraph 3 at page 6 of Procter & Gamble refers to a different embodiment. The particulates, granulates, flakes, noodles, and exudates (page 6, third paragraph) refers to mixtures of silica and zeolite only. There is no AGM in this mixture. Notably, this paragraph refers to a different embodiment than paragraph 2 at page 6 of Procter & Gamble. This disclosure does not mean particles comprising superabsorbent polymers having silica inside.

In the present invention, as a result of mixing the polymerization mixture with the alkali metal silicate before drying, the alkali metal silicate is necessarily distributed inside the particles of the gel that are obtained. This is evidenced by the Declaration of Dr. Manfred Essig on record. Thus, the dried hydrogel particles of the present invention are different from the AGM particles or the sanitary napkins of Procter & Gamble. While it is clear from Procter & Gamble that the AGM does not

include silica inside, the Declaration shows that the dried hydrogel has silica distributed inside. Thus, it has been established that the dried hydrogel of the present invention is **patentably distinct** from the odour control system of Procter & Gamble.

This is further evidenced by new experimental data.

A superabsorber was mixed with additives (water glass and zeolites) under various conditions. SAP, sodium water glass and zeolites in powder form were used for sample [1]. In sample [2], the starting soda water glass was in liquid form. The goal was to show how the sodium water glass is distributed in the cross-section of the samples.

The results of the comparative examples showing that there was no silicium inside the SAP particles.

The comparative examples were done in accordance with WO 97/46195 (see page 6, 4th paragraph and the examples). In Example 1 of WO '195, SAP, zeolite and silica were used in a ratio of 67:50:50. In the present experiment, these compounds were in the same ratio.

WO 97/46195 is silent whether sodium silicate is used as solid or as aqueous solution. Therefore, sodium silicate was used in both forms.

For sample 1 (EDG-0007-17-A), 6.7 g of SAP, 5.0 g zeolite and 5.0 g solid sodium silicate were mixed in a 100 ml bottle using a dry-blend mixer. The images prove that there is a physical mixture only.

For sample 2 (EDG-0007-17-B), 6.7 g of SAP and 5.0 g zeolite were mixed using a Waring blender. Then, 14.08 g of 35.5 wt.% aqueous solution of sodium silicate were added to the Waring blender using a syringe. There was no drying after the mixing with sodium silicate.

The samples were investigated by the following methods:

SEM: Scanning electron microscopy

BSE: Material specific imaging with backscattered electrons at 20 kV

EPMA Electron probe microanalysis

EDXS: Energy dispersive x-ray spectroscopy at 20 kV

After cross sections had been prepared, examples of the particle microstructure of the samples were mapped by means of backscattered electrons (BSE). The BSE images revealed zones of higher density of lighter color (higher concentration/higher atomic number of the elements/lower porosity).

The distribution of Na, O, Si and Al over the particle cross section was characterized by means of EDXS.

Inspection of the images and EDXS results yields the following:

Compared with sample [2], much finer material is evident in sample [1]. If the starting sodium water glass is used in liquid form (sample [2]), the fine component is obviously bound.

The element distribution images for sample [1] show that the SAP particles (recognizable by the high Na content in the images) and the zeolite phase (evident

predominantly in the Al distribution image, assuming the zeolite used contains Al) as well as the sodium water glass phase (recognizable in the Si distribution image and the low Na content) are not present in association with one another. Both the sodium water glass and the zeolite contain Si and O, and so overlapping occurs in places in the element distribution images. This is also the case of Na in SAP and sodium water glass.

The element distribution images of sample [2] prove that the soda water glass phase and the zeolite phase have aggregated and are present either as separate particles or as crusts on the surface of the SAP particles.

The SEM images prove that sodium silicate adheres on the SAP particle surfaces only.

Thus, it has been established that the dried hydrogel of the present invention is **patentably distinct** from the odour control system of Procter & Gamble.

Procter & Gamble refers to crystalline and amorphous silica that means particulate silica, only (page 5, second paragraph). **By mixing of different particulate materials it is impossible to get particles wherein the one material is distributed throughout the other material.** Thus, Procter & Gamble does not disclose a distribution of silica throughout the superabsorbent polymer particles (AGM).

Trinh et al discloses mixtures of superabsorbent particles and zeolite (column 25, lines 35-40). Kieselguhr can also be used (column 2, line 38). As shown in Kirk-

Othmer “Encyclopedia of Chemical Technology”, “Kieselguhr” is a synonym for diatomite (page 109, first paragraph) and diatomite is a particulate material (page 108, first paragraph). **By wet mixing of different particulate materials it is impossible to get particles wherein the one material is distributed throughout the other material.** It is clear to a person of ordinary skill in the art that in case of wet mixing, the particles would still be adjacent to each other and not one inside the other. That means that Trinh et al does not disclose a distribution of silica throughout the superabsorbent polymer particles.

Further, a person skilled in the art had no motivation to replace a porous silica or silicate with a high surface area (Procter & Gamble, page 5, 2nd and 3rd paragraphs) by an alkali metal silicate solution. Solvated alkali metal silicates cannot have any pores.

Modern Superabsorbent Polymer Technology has only been cited to show post-crosslinking and does not cure the defects of Procter & Gamble in view of Trinh et al.

Even if Procter & Gamble, Trinh et al and Modern Superabsorbent Polymer Technology are combined, the present invention cannot result.

In the process of **Claim 10**, admixing of the polymerization reaction mixture is **before or during** the polymerization **or admixing the solid gel with an alkali metal silicate of the general formula I**, $M_2O \times n SiO_2$ (I), occurs.

The admixing of the polymerization mixture with alkali metal silicate has been discussed above for Claim 1 and applies here as well.

Regarding the phrase “solid gel”, Applicants wish to note the following. A solid gel does not mean that the same is dry. In fact, it is well known that a gel has a high water content. See also Modern Superabsorbent Polymer Technology at page 85 (bottom) referring to a “pasty material”, page 86 (top), referring to a “rubbery gel” and page 87 (bottom) “2.5 kg water must be removed for 1 kg of polymer” and the figure at page 91.

Thus, a person of ordinary skill in the art would know that the water content of a solid gel is high.

Further, the admixing the solid gel with an alkali metal silicate is followed by post-crosslinking. Procter & Gamble, Trinh et al lack a disclosure of post-crosslinking. While Modern Superabsorbent Polymer Technology generally discloses the use of post-cross-linking, there is no disclosure that a compound such as an alkali metal silicate is first mixed with a polymer to be post-crosslinked. However, it makes a big difference to the structure of the product obtained. Clearly, a polymer that is post-crosslinked as disclosed in Modern Superabsorbent Polymer Technology **(without being first admixed with a compound)** is different from a polymer particle as obtained in the present invention in which an alkali metal silicate is distributed inside the polymer particle and which is then post-crosslinked.

Even if Procter & Gamble, Trinh et al and Modern Superabsorbent Polymer Technology are combined, the present invention as claimed in Claim 10 cannot result.

Moreover, the Examples of the specification indicate that the hydrogels of the present invention have superior absorbency under load and gel layer permeability.

Example 1 has an absorbency under load of 20.9 g/g and a gel layer permeability of $3 \times 10^{-7} \text{ cm}^3\text{sec/g}$. After solvent and heat treatment for surface post-crosslinking, the absorbency under load is 24.7 g/g and the gel layer permeability is $60 \times 10^{-7} \text{ cm}^3\text{sec/g}$. See page 7, line 40 to page 8, line 11 of the specification.

Comparative Example 1 uses no sodium silicate and as a result the obtained product HAS NO GEL PERMEABILITY. After surface post crosslinking, the gel layer permeability is **three times lower** than Example 1 and only $20 \times 10^{-7} \text{ cm}^3\text{sec/g}$. See page 8, lines 15-25 of the specification.

Example 2 has, after surface post-crosslinking, an absorbency under load of 23.9 g/g and a gel layer permeability of $8 \times 10^{-7} \text{ cm}^3\text{sec/g}$. See page 9, lines 10-12 of the specification.

Comparative Example 2 uses no sodium silicate and has, after surface post crosslinking, a gel layer permeability which is **50% lower** than Example 2 and only $4 \times 10^{-7} \text{ cm}^3\text{sec/g}$. See page 9, line 22 of the specification.

Example 3 has an absorbency under load of 21.4 g/g and a gel layer permeability of $4 \times 10^{-7} \text{ cm}^3\text{sec/g}$ and centrifuge retention of 31.3 g/g. See page 9, lines 36-38 of the specification.

Comparative Example 3 uses no sodium silicate and has an absorbency under load of 20.9 g/g and a gel layer permeability which is **4 times lower** than Example 3 and only $1 \times 10^{-7} \text{ cm}^3 \text{ sec/g}$ and a centrifuge retention of 31.8 g/g. See page 10, lines 5-6 of the specification.

Moreover, **Examples 4-9** are superior to **Comparative Example 4** in absorbency under load and a gel layer permeability and centrifuge retention, as shown in Table 1 at page 11 of the specification.

Examples 10-15 are superior to **Comparative Example 4a** in absorbency under load and a gel layer permeability and centrifuge retention, as shown in Table 2 at pages 11 and 12 of the specification.

Examples 17-19 are superior to **Comparative Example 16** in absorbency under load and a gel layer permeability and centrifuge retention, as shown in Table 3 at pages 12 and 13 of the specification.

Examples 21-24 are superior to **Comparative Example 20** in gel layer permeability and centrifuge retention, as shown in Table 4 at pages 13 of the specification.

Example 25 has an absorbency under load of 21.6 g/g and a centrifuge retention of 30.0 g/g. After surface post-crosslinking, the absorbency under load is

24 g/g and the gel layer permeability is $62 \times 10^{-7} \text{ cm}^3 \text{ sec/g}$. See page 14, lines 21-38 of the specification.

Comparative Example 25 uses no sodium silicate and has an absorbency under load of 12 g/g and a centrifuge retention of 32.8 g/g. After surface post-crosslinking, the absorbency under load is 24 g/g and the gel layer permeability is 33 ($\times 10^{-7} \text{ cm}^3 \text{ sec/g}$) and the centrifuge retention is 28 g/g. See page 15, lines 4-14 of the specification.

Procter & Gamble, Trinh et al and Modern Superabsorbent Polymer Technology, alone or in combination do not suggest the superior results of the present invention obtained when using sodium silicate solution followed by post-crosslinking.

Regarding Claim 18, the admixing the solid gel with an alkali metal silicate is followed by post-crosslinking. Procter & Gamble, Trinh et al lack a disclosure of post-crosslinking. While Modern Superabsorbent Polymer Technology generally discloses the use of post-cross-linking, there is no disclosure that a compound such as a alkali metal silicate is first mixed with a polymer to be post-crosslinked. However, it makes a big difference to the structure of the product obtained. Clearly, a polymer that is post-crosslinked as disclosed in Modern Superabsorbent Polymer Technology **(without being first admixed with a compound)** is different from a polymer particle as obtained in the present invention in which a alkali metal silicate is distributed inside the polymer particle and which is then post-crosslinked.

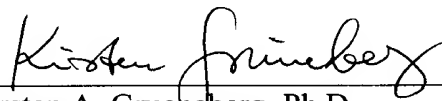
Even if Procter & Gamble, Trinh et al and Modern Superabsorbent Polymer Technology are combined, the present invention as claimed in Claim 18 cannot result.

For the above reasons, it is respectfully requested that the rejections on record be withdrawn.

This application presents allowable subject matter, and the Examiner is kindly requested to pass it to issue. Should the Examiner have any questions regarding the claims or otherwise wish to discuss this case, he is kindly invited to contact Applicants' below-signed representative, who would be happy to provide any assistance deemed necessary in speeding this application to allowance.

Respectfully submitted,

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